

# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference IP/P3315/WOD	<b>FOR FURTHER ACTION</b>		See item 4 below
International application No. PCT/GB2004/001189	International filing date ( <i>day/month/year</i> ) 19 March 2004 (19.03.2004)	Priority date ( <i>day/month/year</i> ) 21 March 2003 (21.03.2003) ]	
International Patent Classification (IPC) or national classification and IPC 7 G01S 13/524, 13/44, H01Q 3/26			
Applicant QINETIQ LIMITED			

1.	This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).																								
2.	<p>This REPORT consists of a total of 10 sheets, including this cover sheet.</p> <p>In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.</p>																								
3.	<p>This report contains indications relating to the following items:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 15%; text-align: center;"><input checked="" type="checkbox"/></td> <td style="width: 35%;">Box No. I</td> <td style="width: 50%;">Basis of the report</td> </tr> <tr> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td>Box No. II</td> <td>Priority</td> </tr> <tr> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td>Box No. III</td> <td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td>Box No. IV</td> <td>Lack of unity of invention</td> </tr> <tr> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td>Box No. V</td> <td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td>Box No. VI</td> <td>Certain documents cited</td> </tr> <tr> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td>Box No. VII</td> <td>Certain defects in the international application</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td>Box No. VIII</td> <td>Certain observations on the international application</td> </tr> </table>	<input checked="" type="checkbox"/>	Box No. I	Basis of the report	<input checked="" type="checkbox"/>	Box No. II	Priority	<input checked="" type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	<input checked="" type="checkbox"/>	Box No. IV	Lack of unity of invention	<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	<input type="checkbox"/>	Box No. VI	Certain documents cited	<input checked="" type="checkbox"/>	Box No. VII	Certain defects in the international application	<input type="checkbox"/>	Box No. VIII	Certain observations on the international application
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<input type="checkbox"/>	Box No. VIII	Certain observations on the international application																							
4.	The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).																								

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Date of issuance of this report 23 September 2005 (23.09.2005)
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# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

RECEIVED

PCT 13 OCT 2004  
WIPO PCT

To:

see form PCT/ISA/220

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY  
(PCT Rule 43bis.1)

Date of mailing  
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference  
see form PCT/ISA/220

**FOR FURTHER ACTION**  
See paragraph 2 below

International application No.  
PCT/GB2004/001189

International filing date (day/month/year)  
19.03.2004

Priority date (day/month/year)  
21.03.2003

International Patent Classification (IPC) or both national classification and IPC  
G01S13/524, G01S13/44, H01Q3/26

Applicant  
QINETIQ LIMITED

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☒ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

**2. FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



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**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/GB2004/001189

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**Box No. I Basis of the opinion**

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1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
  - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
  - a. type of material:
    - ☐ a sequence listing
    - ☐ table(s) related to the sequence listing
  - b. format of material:
    - ☐ in written format
    - ☐ in computer readable form
  - c. time of filing/furnishing:
    - ☐ contained in the international application as filed.
    - ☐ filed together with the international application in computer readable form.
    - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.  
PCT/GB2004/001189

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Box No. II Priority

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1. ☒ The following document has not been furnished:

☒ copy of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(a)).

☐ translation of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(b)).

Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.

2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43*bis*.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.

3. Additional observations, if necessary:

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The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:

- because:

- Form PCT/PEA/237 (January 2004)

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

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PCT/GB2004/001189

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**Box No. IV Lack of unity of Invention**

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1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has:
- ☐ paid additional fees.
  - ☐ paid additional fees under protest.
  - ☒ not paid additional fees.
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
- ☐ complied with
  - ☒ not complied with for the following reasons:  
**see separate sheet**
4. Consequently, this report has been established in respect of the following parts of the international application:
- ☐ all parts.
  - ☒ the parts relating to claims Nos. 1-22,26-28

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**Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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1. Statement

Novelty (N)	Yes: Claims	6-8,13,14,19-22,26,27
	No: Claims	1-5,9-12,15-18,28
Inventive step (IS)	Yes: Claims	6,19
	No: Claims	1-5,7-18,20-22,26-28
Industrial applicability (IA)	Yes: Claims	1-22,26-28
	No: Claims	

2. Citations and explanations

**see separate sheet**

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/GB2004/001189

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**Box No. VII Certain defects in the International application**

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The following defects in the form or contents of the international application have been noted:

see separate sheet

1. Reference is made to the following documents:

- D1: Klemm R: "Prospectives in stap research" Proceedings of the 2000 IEEE sensor array and multichannel signal processing workshop, Cambridge, Ma, USA, 16-17 March 2000, 16 March 2000, pages 7-11, XP010516038
- D2: Zatman M et al: "Time delay steering architectures for space-time adaptive processing" Antennas and propagation society international symposium, 1997 IEEE, 1997 Digest Montreal, QUE., Canada 13-18 July 1997, New York, NY, USA, IEEE, US, 13 July 1997, pages 2426-2429, XP010246697 ISBN: 0-7803-4178-3

2. **Section IV:**

This ISA found three inventions in this international application:

1. Claims 1-22 and 26-28:

A time delay beamformer including steering time delay means

2. Claims 23, 24:

A method of reducing the computational load associated with beamforming

3. Claim 25:

A method of increasing the resolution of a sideways sensing sensor array

These three inventions are not so linked as to form a single general inventive concept (Rule 13.1 PCT).

3. **Section V:**

The subject-matter of claim 1 is not new (Article 33 (2) PCT).

D1 discloses a time delay beamformer comprising a plurality of input channels, each channel having associated sampling means arranged to sample an input signal carried upon the input channel at a plurality of points in time to produce a plurality of sampled signals (D1, page 9, left hand co-



lumn, lines 3-7, D1, Fig. 6, MxN input channels);  
processing means arranged to receive said input signals and said sampled signals, or signals indicative of each of the input signals and each of the plurality of sampled signals, and arranged to generate processed signals therefrom (D1, page 9, left hand column, lines 6-7, D1, Fig. 6, clutter and jammer suppression); steering time delay means arranged to introduce a steering time delay to said processed signals, or to signals indicative of said processed signals to produce at least two delayed signals (D1, page 9, left hand column, lines 7-9, D1, Fig. 6, time matched filter); and  
summation means arranged to generate a beamformed output signal from the delayed signals, or from signals derived from the delayed signals (cf. D1, Fig. 6, summation means  $\Sigma$ ).

Hence, D1 discloses a beamformer having all the features of present claim 1.

4. The subject-matter of claims 2-5 and 9-12 is anticipated by the NxM adaptive space-time processor shown in D1, Fig. 6 and does not seem to add any additional features which go beyond the disclosure of D1 (Article 33 (2) PCT).
5. The subject-matter of claims 7, 8, 13, 14, 26 and 27 refer to beamforming providing flexible time delay steering (controlled time delays, adapted to pulse repetition interval, multiple beams) which is already known in the art (see D2, page 2428 and D2, Fig. 5). The inclusion of such features into the arrangement known from D1, Fig. 6 lacks inventive step (Article 33 (3) PCT).
6. These considerations apply equally to corresponding method claims 15-18 (lack of novelty), 20-22 (lack of inventive step) and independent claim 28 (lack of novelty).
7. The subject-matter of claims 6 and 19 is neither disclosed nor rendered obvious by the available prior art and therefore meets the requirements of Articles 33 (2) and (3) PCT.

**8. Section VII:**

- a. To meet the requirements of Rule 6.3(b) PCT, the independent claims should be properly cast in the two part form, with those features which are part of the prior art (see D1) being placed in the preamble (Rule 6.3(b)(I) PCT) and the subject-matter, for which protection is sought, being placed in the characterising portion (Rule 6.3(b)(ii) PCT).  
The remaining claims should be adapted to these new claims.
- b. It appears appropriate to incorporate reference numerals in the claims to features in the drawings. The technical features of the claims would be rendered more intelligible by relating these features to the corresponding features of the drawings (Rule 6.2(b) PCT). This applies to both the preamble and characterising portion.
- c. The opening pages of the description should be brought into line with the new independent claims (Rule 5.1(a) (iii) PCT). In particular, it will be necessary to replace the statement of the invention commencing on page 3, line 7, by a statement strictly in conformity with the new main claims.
- d. In order to indicate more completely the background art useful for understanding the invention, the abovementioned documents D1 and D2 should be acknowledged in the description (Rule 5.1(a)(ii) PCT).